SPILLS ACTION CENTRE
SUMMARY REPORT
OF
1989 OCCURRENCES

DECEMBER 1990

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1989 OCCURRENCES

Report prepared by:

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Approvals and Engineering Division
Ontario Ministry of the Environment

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EXECUTIVE SUMMARY

This report summarizes occurrences reported to Environment Ontario's Spills Action Centre (SAC) during the calendar year of 1989. It also provides some comparisons to previous years especially to the calendar year of 1988 which was the first year the Ministry implemented its computerized Occurrence Reporting Information System (ORIS) to document spills and other environmental incidents.

In 1989 there were 15,861 occurrences reported to SAC and documented on ORIS. These included 5,437 occurrences classified as notifications or notifiable discharges other than spills, 5,345 environmental spills, 4,239 environmental complaints and 840 occurrences which were classified as others.

Occurrences reported to SAC have been increasing at a rate of about 20% a year over the past four years. This increase in reported incidents is attributed to a variety of factors including Ontario's stringent spill reporting requirements and increased reporting of small quantity spills. There has also been a growing awareness of both environmental responsibilities and SAC's 24-hour province-wide service for dealing with urgent environmental matters.

Almost half (49.8%) of the spills reported to SAC in 1989 were classified as oil or fuel spills. Chemicals or chemical solutions accounted for about 19.6%, gaseous emissions 15.2%, wastes or wastewaters 13.4% while other and unknown materials accounted for the remaining 2.0%. These values are very similar to those documented in 1988.

In general, the spill quantity information shows a trend towards increased reporting of smaller spills. For example, in 1989 almost one third of reported oil or fuel spills with known quantities were less than 10 litres and almost two thirds were less than 100 litres. By comparison in 1988, about one fifth were less than 10 litres and a little more than half were less than 100 litres.

The industrial sectors with the largest proportions of reported spills in 1989 were transportation (13.4%), petroleum (13.3%), chemical (10.9%) and metallurgical (9.4%). Spills associated with electric utilities accounted for 10.6%. The remainder were from sewage treatment plants, and a range of industrial, agricultural, and residential sectors each of which was less than 5%.

The main causes attributed to spills were container and fuel tank leaks, pipe and hose leaks, discharges and bypasses to watercourses, and process upsets resulting in discharges to air. The two most prevalent reasons for spills were equipment failure and human error.

Of the 5,345 spills reported to SAC in 1989, 56.1% were spills to land, 21.2% were spills to water, 14.5% were spills to air and 8.2% were to various combinations of land, water and air. About one third (388) of the spills to water were directly to the Great Lakes system. These included 173 to Lake Ontario, 77 to the St. Clair River, 34 to the St. Lawrence River and 24 to the Detroit River. Lake Erie, Lake Superior and the St. Mary's River each had 17 spills, Lake Huron 14, Georgian Bay 13 and the Niagara River 2.

Information contained in this report along with previous summaries and details extracted from ORIS are currently being used to assist the Ministry in identifying environmental problems requiring abatement and enforcement actions and to develop appropriate spill reduction strategies and pollution abatement programs.

INTRODUCTION

This report provides a summarized review of the occurrences reported to Environment Ontario's Spills Action Centre (SAC) during the calendar year of 1989. Part I of the report deals with all occurrences reported to SAC. Part II focuses on spills.

The Centre began operations on November 29, 1985, the same day that Part IX of the Environmental Protection Act ("Spills Bill") came into force. SAC operates a province-wide toll-free number for receiving reports of spills and other urgent environmental matters on a 24 hour-per-day basis. SAC environmental officers are required to evaluate all occurrences reported to them and to decide on the appropriate action to be taken. This may include any or all of the following:

- Contact suspected pollution source in an attempt to verify and resolve the problem;

- Contact local Ministry of the Environment (MOE) personnel to initiate a field response when necessary;

- Contact other agencies or potentially affected parties as needed; police, fire departments, ambulance, local municipal authorities, Coast Guard, US authorities, etc.;

- Notify senior ministry management if the incident is judged to be serious, and co-ordinate information flow to the public;

- Contact the Minister's office and convey orders or directions from the Minister where necessary;

- Maintain liaison with the agencies in charge of public safety in an emergency and co-ordinate the ministry's support for their efforts;

- Provide ministry staff and others with information on chemicals and cleanup techniques, either directly or through CANUTEC;

- Record the details of non-urgent incidents and forward them to the appropriate district office or other agencies for response during normal business hours.

Regardless of what action is initiated, all occurrences are recorded on SAC's computerized data management system. Since January 1, 1988 all incidents reported to SAC have been documented on a relational data management system which is called the Occurrence Reporting Information System (ORIS). The system enables SAC and some other Ministry offices to produce routine summaries and non-routine data searches. Each occurrence record consists of a text summary identifying the main elements of the incident. A number of fields are also coded in order to facilitate routine data retrieval. A sample occurrence report and a listing of coding categories used for ORIS is included in the appendices.

The information presented in this document represents SAC's second calendar year summary obtained by extracting data from ORIS. While the summaries presented have gone through numerous checks and balances they should not be viewed as being absolute or error free. All databases of this magnitude are subject to error.

Information that comes in during spills and emergencies is not always exact and frequently changes. SAC environmental officers are required to exercise discretion when entering codes or other data relating to an occurrence. Since ORIS is a relational database, changes made at any time can have an affect on incidents recorded earlier and on related summaries. To a certain extent the information presented in this report is a "snapshot" of the information that existed on the system at the time the summaries were generated.

TYPES OF OCCURRENCES

All occurrences reported to SAC are classified into one of the following four occurrence categories:

Spills: - Part IX of the Environmental Protection Act defines a spill as a discharge of a pollutant which may have adverse effects, into the natural environment where the discharge is from a container or structure and is abnormal in light of all circumstances. A spill must be reported and cleaned up if it causes or is likely to cause adverse effects.

Notifications:- This category which is sometimes referred to as "notifiable discharges other than spills" is used to catch a range of ministry notifications. These include reports required through legislation or regulation such as Sections 12 and 14 of the Environmental Protection Act or Section 9 of Regulation 308. Also included are reports made as a condition of operation in a certificate of approval or other conditions of operation which require a facility to report certain deviations in operations or fluctuations in discharges of pollutants. Some interjurisdictional reports which are required to be made in accordance with agreements are also included in this category.

Notifications (cont) It is important to note that the distinction between the spill category and the notification category is not always clear and some notifiable discharges may be borderline or quasi spills. In fact, in 1986, SAC's first year of operation, the two categories were actually grouped together and all referred to as spills. Since March 1987, SAC has applied the more rigorous Part IX EP Act definition of a spill, and the notification category has been kept separate. The spill and notification categories combined are referred to as "reportable occurrences".

Complaints: - Expressions of concerns or dissatisfaction about environmental problems reported to SAC by the general public. The vast majority of all complaints documented at SAC are received during the hours when local Ministry offices are closed.

Others: - Occurrences which do not fall into the preceding categories are classified in this category. These include such occurrences as hazardous materials released and contained in a building or spilled inside an enclosed truck, and spill exercises.

PART I

OCCURRENCES IN GENERAL

The Spills Action Centre was established to deal primarily with spills. The centre began operations on November 29, 1985 in anticipation of a greater number of reportable spills resulting from tougher spills legislation and an overall increase in environmental awareness. As SAC's province-wide, toll-free number has become better known it has been used increasingly for reporting spills as well as numerous other environmental matters. This part of the report reviews all of the occurrences reported to SAC in 1989. Part II will focus specifically on spills.

SAC is responsible for maintaining spill records for the whole Ministry. Spills may be reported to SAC in one of two ways. First, they may be reported directly to SAC by the discharger, other government agencies, or the public. This accounts for the majority of spills reported to SAC. Second, they may be reported indirectly via other ministry offices. Ministry regional staff who receive spill reports are instructed to relay these reports to SAC as soon as possible to ensure SAC is aware of the spills and to enable SAC to document spill records in a timely fashion.

Spill summaries and other summaries presented in this report are based on the date the occurrences were reported to SAC. If a spill occurred in 1988 but was not reported and documented at SAC until 1989 then it appears in the 1989 spill summaries. The occurrence date was not used as the basis for summaries because for some incidents the occurrence date is unknown. All spill reports phoned into

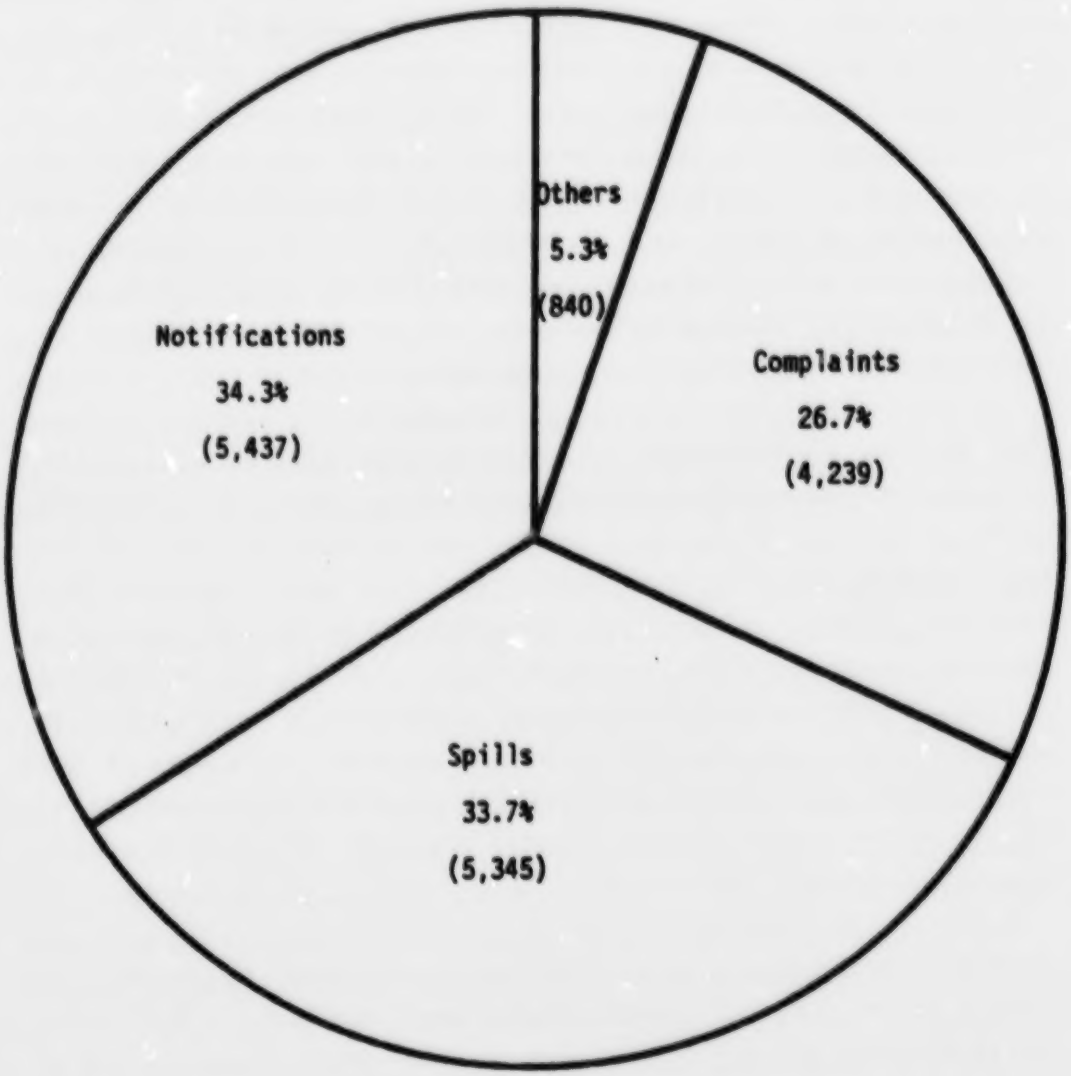
SAC are entered into the computer system the same day they are reported. Those that are reported, after the fact, to SAC via subsequent ministry field reports, are entered on a non-priority basis. For these the differences between the date of occurrence, date reported to MOE and date reported to SAC can be significant. Of the 5,345 spills which are documented in this 1989 summary, 205 (3.8%) occurred in 1988 but were not entered into the system until 1989. It is anticipated that this number will be greatly reduced in 1990 as field reporting is improved.

SAC is not responsible for maintaining complete Ministry records of complaints, notifications or other occurrences handled by the Ministry. These are generally reported to SAC during "off-hours" when the district offices are closed. The district and regional offices are normally open from 8:15 a.m. to 4:30 p.m. A large number of complaints and notifications are reported to these offices directly during regular business hours. There is no requirement to forward information on these occurrences to SAC. As a result, SAC records do not reflect Ministry totals for these categories.

Figure 1 provides a breakdown of occurrences by type. In 1989, 33.7% of SAC occurrences were spills. Non-spill notifications slightly exceeded spills accounting for 34.3% of SAC occurrences. Environmental complaints were slightly lower at 26.7%, while other occurrences made up the remaining 5.3%.

A breakdown of all SAC occurrences by MOE Region is provided in Figure 2. This bar-graph shows that in 1989

FIGURE 1
OCCURRENCES REPORTED TO SAC BY TYPE: JAN 1, 1989 TO DEC 31, 1989



NOTE: A total of 15,861 occurrences were reported to SAC in 1989.

35.5% of all SAC occurrences involved the Ministry's West - Central Region (WC). The next highest was Central Region (C) at 29.8% followed by Southwestern (SW) at 13.2%, Southeastern (SE) at 10.7%, Northeastern (NE) at 8.7% and Northwestern (NW) at 2.2%.

Figures 3, 4 and 5 show the distribution of spills, notifications and complaints dealt with by SAC for all six regions. It can be seen that Central Region had the most spills and off-hour complaints while West Central Region had the most notifications.

A detailed tabulation of 1989 SAC occurrences by type, MOE Region and district is provided in Table 1. Table 1 also shows the estimated population served by each of the Ministry regions and districts.

In 1988, it was determined that there was a strong relationship between population served by a district office and the number of environmental complaints received for that district through SAC. The 1989 statistics support this rather obvious relationship. The relationship between number of spills reported and population served was only moderately positive.

Figure 6 shows the seasonal fluctuations of the four main occurrence categories reported to SAC during 1989. As was the case in 1988, it can be seen that SAC deals with more occurrences during warmer months than during colder months. This is primarily due to an increased number of environmental complaints which are received during the warmer months when people are involved in more outside activities and are more likely to notice environmental problems. The complaint category can be further broken

FIGURE 2
SAC OCCURRENCES BY MOE REGION

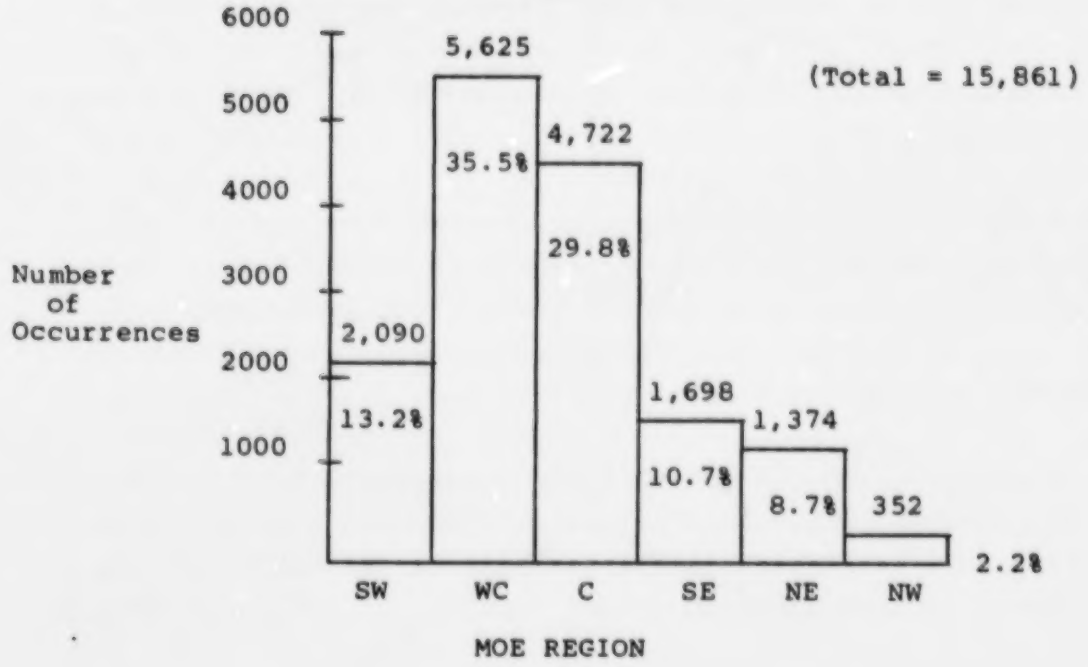


FIGURE 3
SPILLS BY MOE REGION

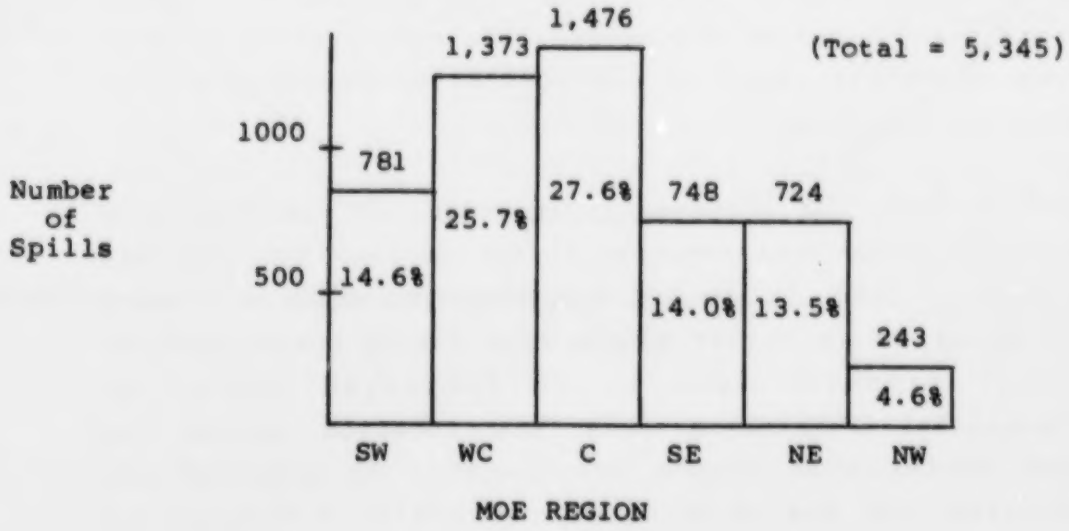


FIGURE 4
SAC NOTIFICATIONS BY MOE REGION

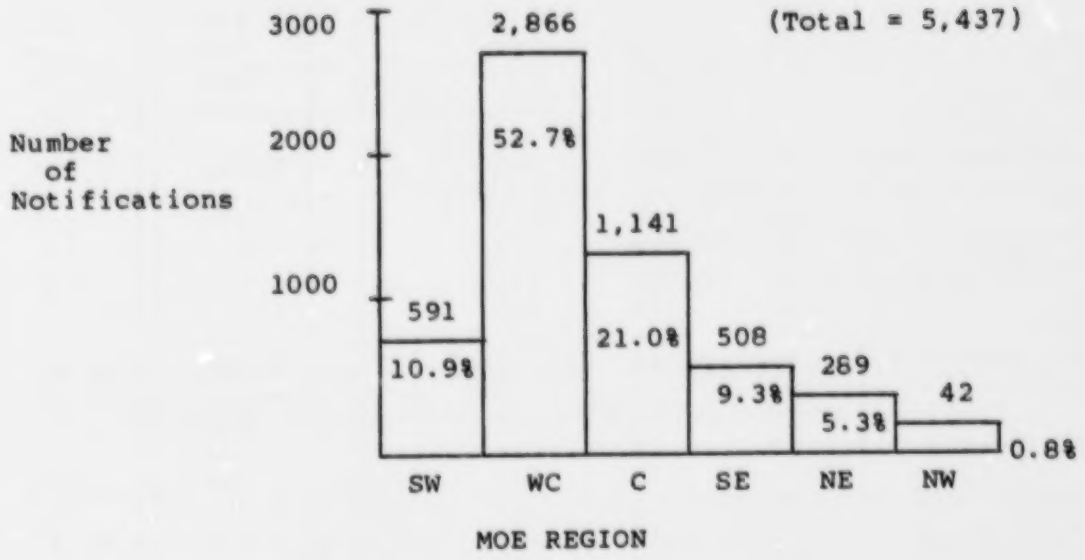


FIGURE 5
SAC COMPLAINTS BY MOE REGION

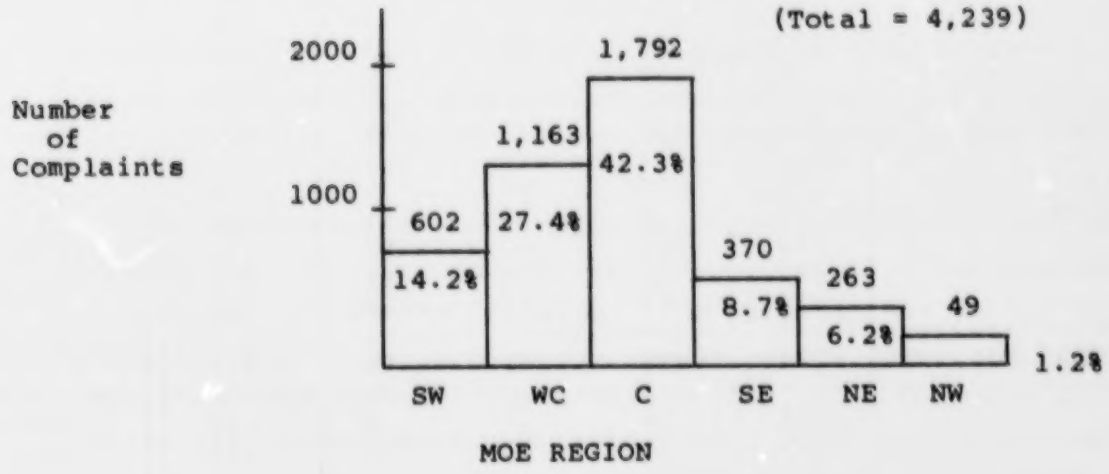


TABLE 1

REGIONAL BREAKDOWN OF ALL OCCURRENCES REPORTED TO SAC

MOE REGIONAL & DISTRICT OFFICES	OCCURRENCE CATEGORIES					POPULATION SERVED *('000)
	S	N	C	O	TOTAL	
LONDON	215	113	173	34	535	564
OWEN SOUND	138	26	86	15	265	188
SARNIA	296	421	132	40	889	120
WINDSOR	132	31	211	27	401	420
SOUTHWESTERN RGN. TTL	**781**	**591**	**602**	**116**	**2,090**	**1,292**
CAMBRIDGE	246	64	427	55	792	520
HALDIMAND NORFOLK	161	378	74	36	649	191
HAMILTON WENTWORTH	601	2,028	353	89	3,071	429
WELLAND	365	396	309	43	1,113	365
WESTCENTRAL RGN. TTL	**1,373**	**2,866**	**1,163**	**223**	**5,625**	**1,505**
BARRIE	129	16	74	11	230	242
MUSKOKA HALIBURTON	57	15	56	18	146	52
OAKVILLE	317	673	367	85	1,442	890
PETERBOROUGH	112	10	83	8	213	222
TORONTO EAST	259	273	518	72	1,122	1,138
TORONTO WEST	282	54	447	67	850	996
YORK DURHAM	320	100	247	52	719	757
CENTRAL RGN. TTL	**1,476**	**1,141**	**1,792**	**313**	**4,722**	**4,297**
BELLEVILLE	101	15	24	5	145	90
CORNWALL	206	40	165	16	427	161
KINGSTON	182	416	93	21	712	280
OTTAWA	207	34	69	24	334	673
PEMBROKE	52	3	19	6	80	87
SOUTHEASTERN RGN. TTL	**748**	**508**	**370**	**72**	**1,698**	**1,291**
NORTH BAY	96	20	36	5	157	103
PARRY SOUND	16	4	8	1	29	15
SUDBURY	276	202	86	58	622	171
SAULT STE. MARIE	163	21	100	19	303	121
TIMMINS	173	42	33	15	263	107
NORTHEASTERN RGN. TTL	**724**	**289**	**263**	**98**	**1,374**	**517**
KENORA	104	16	17	8	145	54
THUNDER BAY	139	26	32	10	207	141
NORTHWESTERN RGN. TTL	**243**	**42**	**49**	**18**	**352**	**195**
GRAND TOTAL	**5,345**	**5,437**	**4,239**	**840**	**15,861**	**9,097**

S = Spills
N = Notifications
C = Complaints
O = Others

*Estimated using 1988 Municipal Directory populations

down as follows and compared to 1988 values:

	1989	1988
· Odour -	45.8%	55.1%
· Water Pollution -	16.5%	12.1%
· Smoke -	10.3%	8.2%
· Dust -	7.0%	7.5%
· Noise -	4.5%	3.5%
· Other complaints -	15.9%	13.6%

For 1989 "other complaints" included about 118 litter complaints and 25 drinking water complaints.

Figure 7 provides a two year comparison of SAC's four occurrence types for the years 1988 and 1989. During this time frame, reported spills increased by 31%. Notifications were up by 29% and complaints increased by 8%. Occurrences classified as others actually decreased by almost 14%.

The increase in total SAC occurrences from 1986 to 1989 is shown in Figure 8. During this four year period the number of occurrences handled by SAC increased by 75%.

Large increases in reportable occurrences such as spills should not be interpreted as an indicator that spills themselves are on the increase. The Ministry has no way of knowing the true number of spills which occur in the Province each year. The Ministry can only document and summarize those which are reported. More spills can be expected to be reported as industries, agencies and the general public become more aware of their environmental responsibilities and Ontario's spill reporting

requirements, as well as the Spills Action Centre's 24-hour province-wide service.

In the coming year SAC will be reviewing the various categories of reported occurrences in order to identify and possibly reduce the number of routine (non-urgent) incidents which are reported. If these types of occurrences can be reduced, SAC staff will be able to devote more time to handling spills that cause adverse effects and other urgent environmental incidents.

FIGURE 6
SAC OCCURRENCES BY TYPE AND MONTH FOR 1989

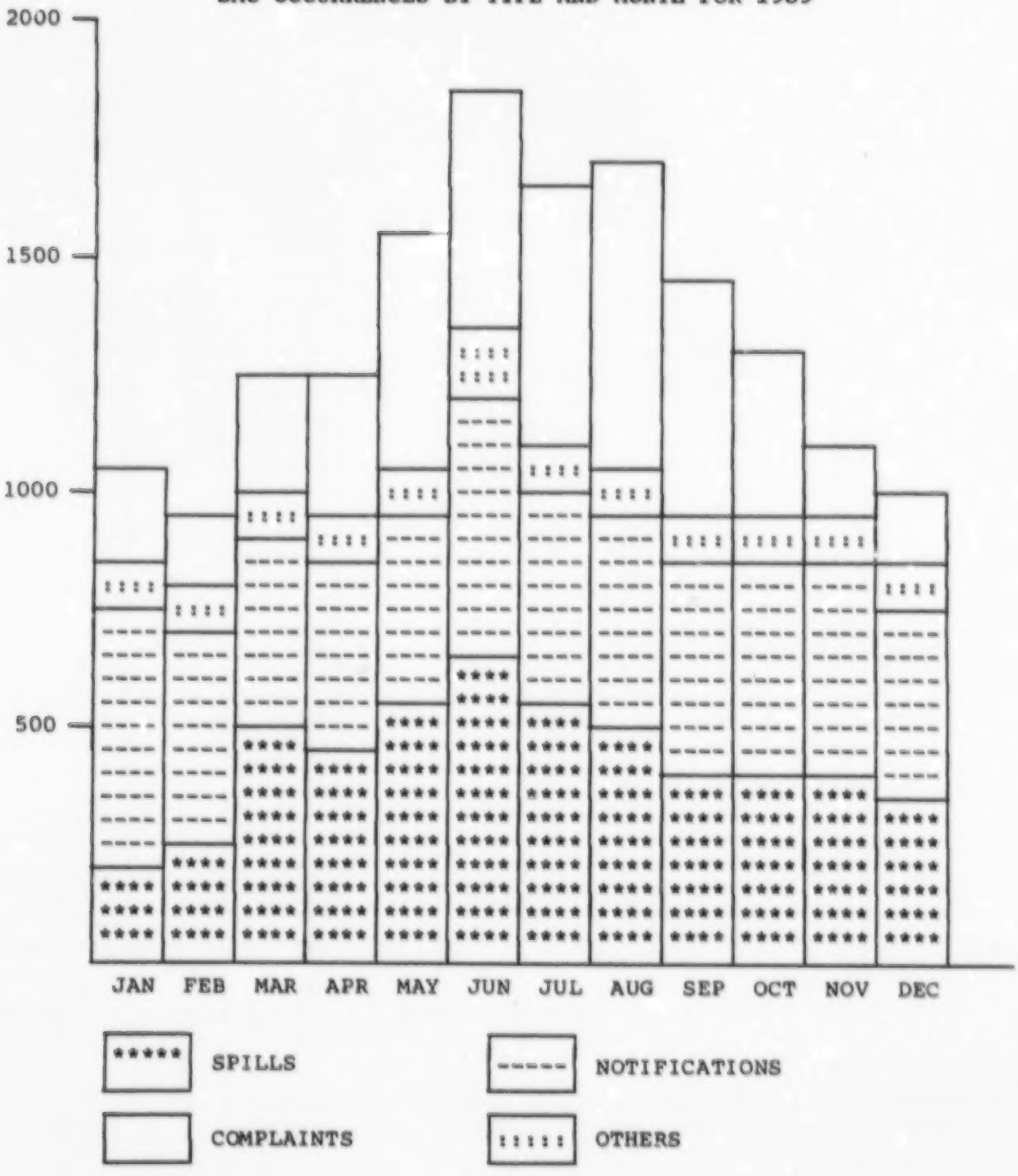


FIGURE 7
TWO YEAR COMPARISON BY OCCURRENCE TYPE FOR 1988 & 1989

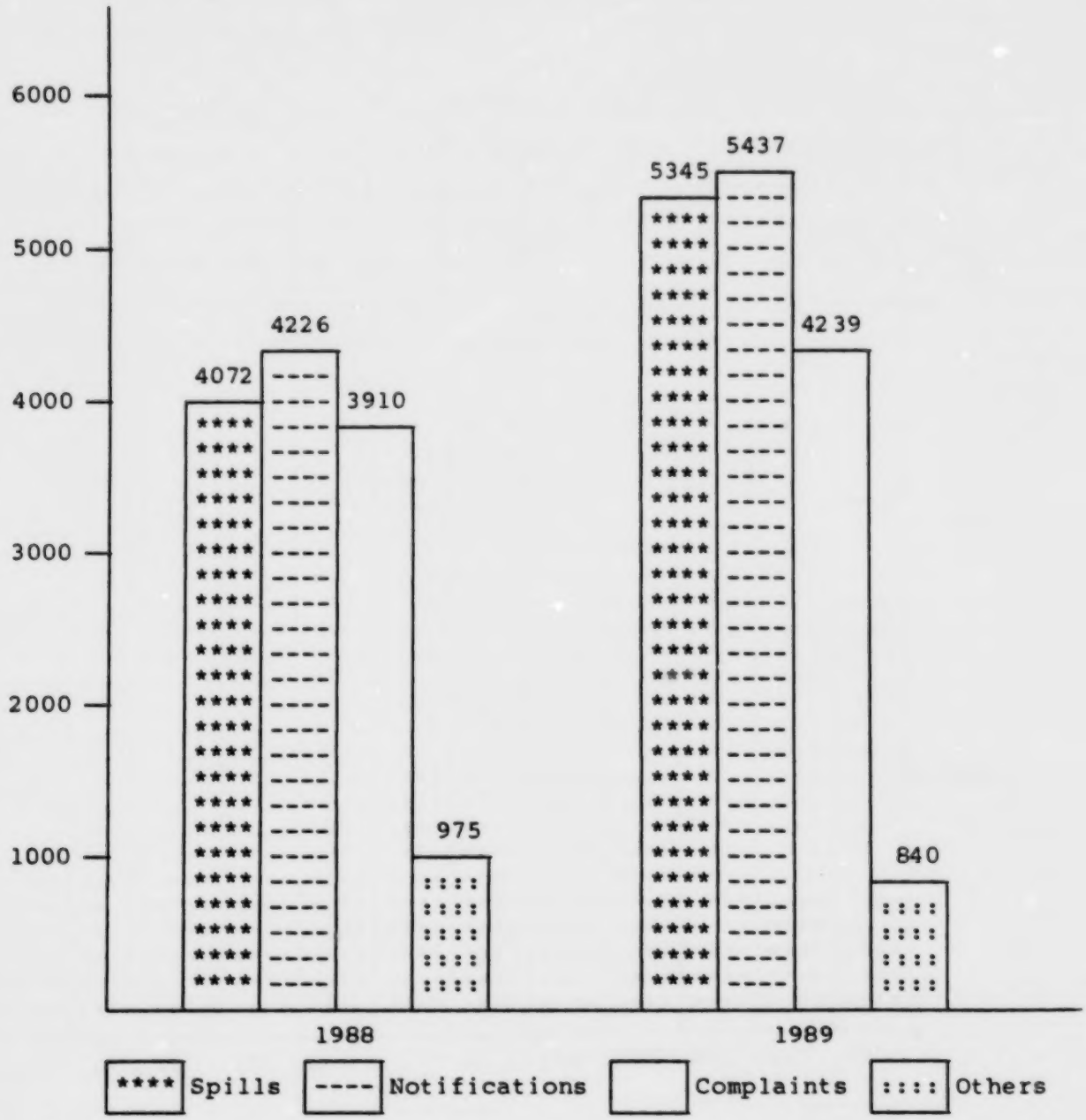
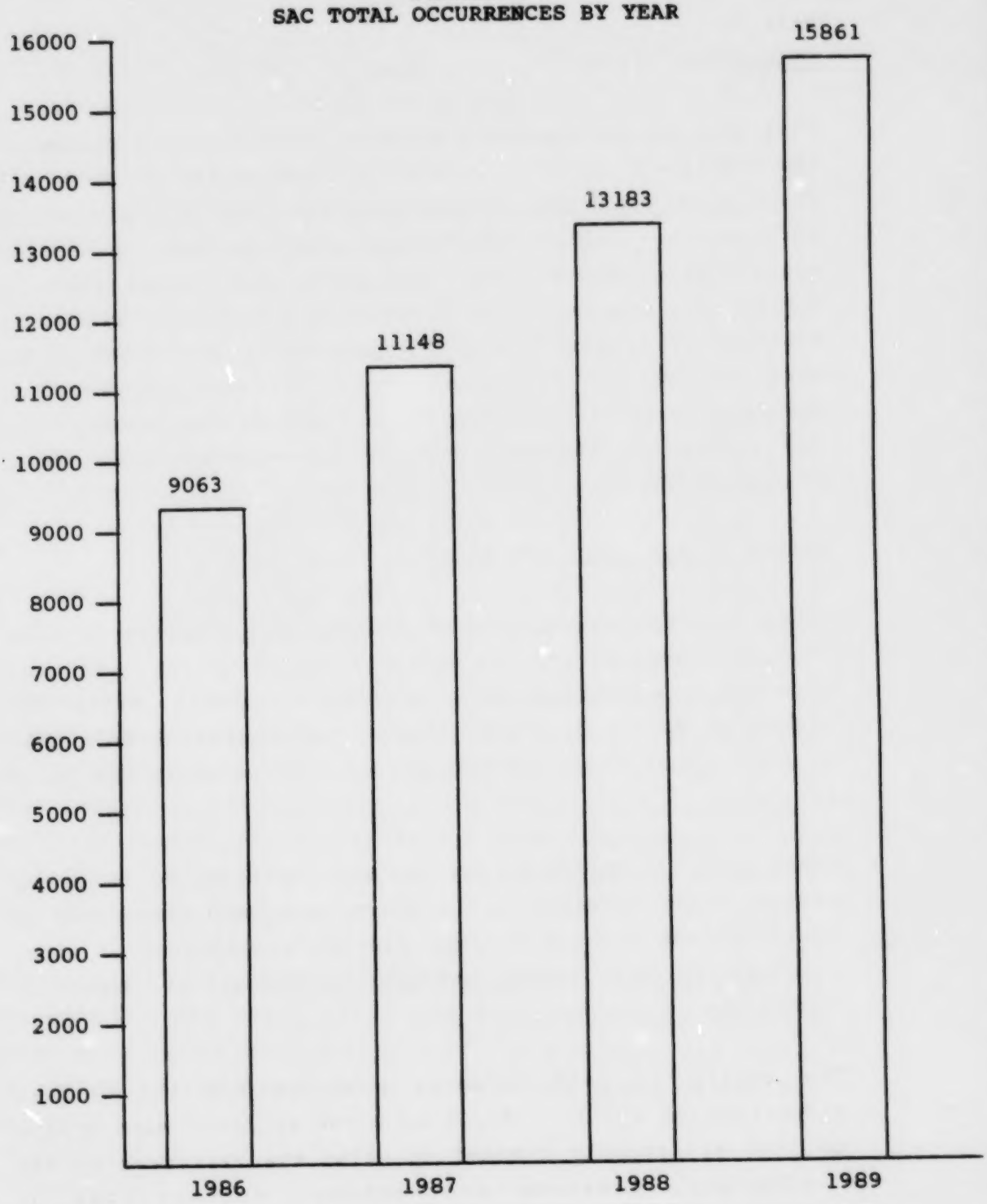


FIGURE 8
SAC TOTAL OCCURRENCES BY YEAR



PART II
SPILLS

This part of the report provides a more detailed review of the number and types of spills reported to SAC in 1989. It also provides some comparisons to the spill results obtained in 1988. Generally, the various summarized categories presented are consistent with those used by Environment Canada in their National Analysis of Trends in Emergencies System (the NATES program). The NATES codes were originally developed in an attempt to try and standardize spill reporting results across the country. To the extent practicable, Ontario has adopted these NATES coding categories.

SPILLS TO AIR, LAND AND WATER

Table 2 summarizes spills by medium, i.e., spills to air, land and water as well as multiple medium spills. It also provides a comparison to the 1988 results. While the number of spills in each category has increased from 1988 to 1989 the relative percentages of each category are quite similar.

There were 776 spills to air in 1989. This number does not include those releases to air which have been classified as notifications such as sulphur dioxide exceedences or minor releases to air during changes in industrial operating conditions.

The spills to land category accounts for the largest proportion of spills - 56.1% or 2,996 spills. Most spills to land are readily cleaned up using the resources of the discharger, clean-up contractors, cooperatives or municipalities.

TABLE 2
SPILLS BY MEDIUM

	1988		1989	
	No. of Spills	%	No. of Spills	%
To Land	2261	55.5	2996	56.1
To Water	969	23.8	1135	21.2
To Air	543	13.3	776	14.5
To Land and Water	243	6.0	355	6.6
To Air and Land	51	1.3	75	1.4
To Air and Water	5	0.1	8	0.2
TOTAL	4072	100.0	5345	100.0

There were 1,135 occurrences which were documented as spills to water in 1989. This number does not include all of the minor contaminant exceedences to watercourses, which were required to be reported to the Ministry, by companies, as conditions of operation. Such occurrences are documented as notifications and therefore do not appear in the spill summaries.

The spills to water category in Table 2 includes 388 spills directly to the Great Lakes and interconnecting channels which were reported to SAC in 1989. A more detailed review of spills to the Great Lakes is provided later on in this report.

MATERIALS

Table 3 is a tabulation of spills by material type and MOE region. The grand total of 5,689 materials spilled exceeds the total for number of spills reported to SAC in 1989 (5,345). This discrepancy is attributable to a number of spill occurrences which involved two or more spilled materials.

Oils constitute 49.8% (2,831) of all spilled materials reported in 1989. Gasoline, fuel oils and light petroleum oils account for most of these with the majority being operating fuels dicharged as a result of transportation accidents or fuel leaks from fixed storage facilities.

The second largest category in Table 3 is chemicals which include chemical solutions. These comprise 19.6% of all materials spilled. As was the case in 1988, the two largest chemical sub-categories are "other organic" and "other inorganic" which together account for just over half of all chemicals spilled and 11.2% of all materials spilled. A review of these two sub-categories to identify additional meaningful sub groupings is pending. Spills involving PCBs (Polychlorinated Biphenyls) in concentrations greater than 50 parts per million account for 12.2% of chemical spills and 2.4% of all spills reported to SAC in 1989.

TABLE 3
SPILLS BY MATERIAL AND REGION

(FOR PERIOD OF JAN 01 1989 TO DEC 31 1989)

MOE REGION:	SW	WC	C	SE	NE	NW	TOTAL	%
OILS:								
CRUDE	6	2	1	1	0	0	10	0.2
GASOLINE/JET FUEL	91	94	215	97	55	35	587	10.3
LIGHT PETROLEUM OILS	219	301	594	301	222	91	1,728	30.4
HEAVY PETROLEUM OILS	28	32	51	26	23	7	167	2.9
OTHER PETROLEUM OILS	69	65	86	36	38	12	306	5.4
NON-PETROLEUM OILS	2	25	2	1	2	1	33	0.6
SUB TOTALS	415	519	949	462	340	146	2,831	49.8
CHEMICALS:								
ACIDS	18	44	28	25	19	6	140	2.5
BASES	4	15	13	9	5	2	48	0.8
HALOGENATED SOLVENTS	2	1	1	1	0	1	6	0.1
NON-HALOGENATED "	41	12	22	6	0	2	83	1.5
PESTICIDES	16	13	16	5	10	1	61	1.1
PCB'S	22	24	52	21	13	5	137	2.4
OTHER ORGANIC	64	127	133	61	25	14	424	7.4
OTHER INORGANIC	47	62	46	23	38	3	219	3.8
SUB TOTALS	214	298	311	151	110	34	1,118	19.6
GASES:								
SMOKE	15	147	38	6	18	2	226	4.0
DUST	11	126	13	29	3	2	184	3.2
NATURAL GAS	7	1	6	0	0	0	14	0.3
NOX	1	0	4	27	0	0	32	0.6
SO2	0	5	1	0	30	0	36	0.6
OTHER GASES	68	200	50	25	25	4	372	6.5
SUB TOTALS	102	479	112	87	76	8	864	15.2
WASTES:								
LIQUID INDUSTRIAL	30	79	21	15	79	23	247	4.3
HAZARDOUS	1	6	5	3	6	1	22	0.4
NON-HAZARDOUS SOLID	5	2	11	1	8	1	28	0.5
SEWAGE	23	35	62	35	85	23	263	4.6
AGRICULTURAL	28	18	5	6	1	0	58	1.0
OTHER WASTES	22	61	22	6	22	12	145	2.6
SUB TOTALS	109	201	126	66	201	60	763	13.4
UNKNOWN	7	24	32	11	7	0	81	1.4
OTHER MATERIALS	3	8	9	0	11	1	32	0.6
TOTALS	850	1,529	1,539	777	745	249	5,689	100

TABLE 4
TWO YEAR COMPARISON OF SPILLS BY MATERIAL

MATERIAL	YEAR	
	1988	1989
OILS	50.8% (2136)	49.8% (2831)
CHEMICALS	19.0% (798)	19.6% (1118)
GASES	13.0% (546)	15.2% (864)
WASTES	14.3% (602)	13.4% (763)
UNKNOWN	2.3% (96)	1.4% (81)
OTHER	0.6% (24)	0.6% (32)
TOTALS	100.0% (4202)	100.0% (5689)

A two year comparison of spills by material is provided in Table 4. The relative percentages of each major material category are shown along with the actual number of materials spilled. The latter appears in brackets below the percent figures. Essentially the results presented in Table 4 show that there have not been any significant changes in the types of materials spilled in 1989 as compared to 1988.

QUANTITIES

For purpose of this report, spill quantity information is presented by sorting liquid spills of the main material categories (oils, chemicals and wastes) into seven quantity groups:

1. - less than 10 litres
2. - 10 to 100 litres (up to but not including 100)
3. - 100 to 1,000 litres
4. - 1,000 to 10,000 litres
5. - 10,000 to 100,000 litres
6. - 100,000 to 1,000,000 litres
7. - greater than 1,000,000 litres

The reasons for presenting spill quantity information in this manner are discussed in SAC's Summary Report of 1988 Occurrences. Essentially it was felt that adding quantities of disimilar materials with varying contaminant concentrations would not be very meaningful.

Figure 9 shows the percentage of oil spills for each of the quantity categories identified above. It can be seen that in 1989, 29.1% of the oil spills with known quantities were less than 10 litres, 63.5% less than 100 litres (about the size of a fuel tank in a large North American vehicle) and 93.0% less than 1,000 litres (about the size of a home heating fuel tank). The corresponding figures for 1988 were 20.9% less than 10 litres, 56.5% less than 100 litres and 90.5% less than 1000 litres.

There was a substantial increase in the number of oil spills reported in 1989 as compared to 1988 (2,831 versus 2,136). However, the comparable quantity percentage figures for these

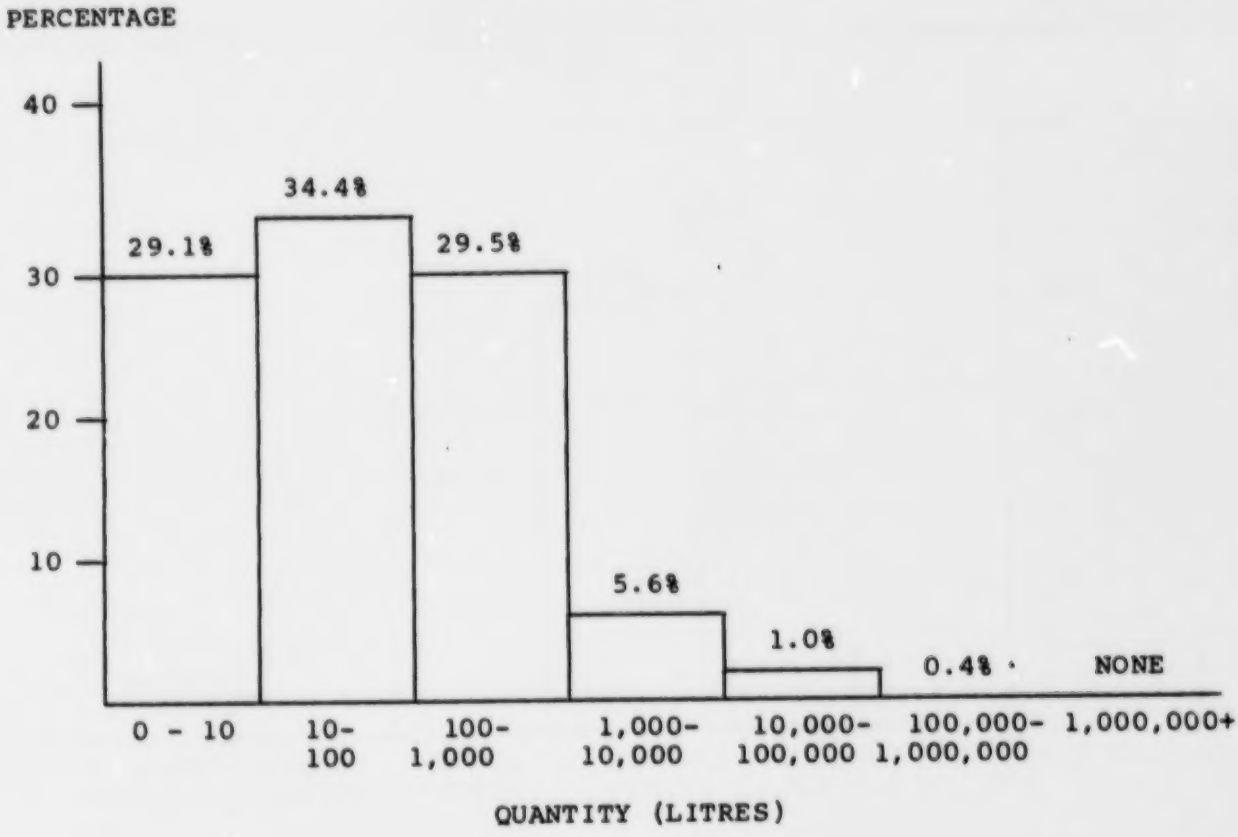
two years, shown in the preceding paragraph, suggest that a significant portion of this increase was due to increased reporting of smaller quantity spills.

Figure 10 provides a breakdown of chemical spill quantities. The percentages shown here are very similar to those presented in 1988 except for a slight increase in 0-10 litre spills in 1989 (24.4% vs. 20.3%) and a slight decrease in 10-100 litre spills (22.1% vs. 27.2%). Chemical spill quantities are generally higher than oil spill quantities because they include spills of chemical solutions where the contaminant of concern makes up a small percentage of the reported spill quantity. This applies even more so to waste or wastewater spills which frequently consist of large quantities of water carrying low concentrations of contaminants.

Similar to the oil spill quantity results, the waste spill quantities in Figure 11 show a clear shift towards the reporting of smaller quantity spills as compared to the 1988 results. In 1989, 3.6% of reported waste spills were less than 10 litres (as compared to 1.5% in 1988), 13.8% were less than 100 litres (as compared to 7.8% in 1988) and 35.8% were less than 1,000 litres (as compared to 20.3% in 1988).

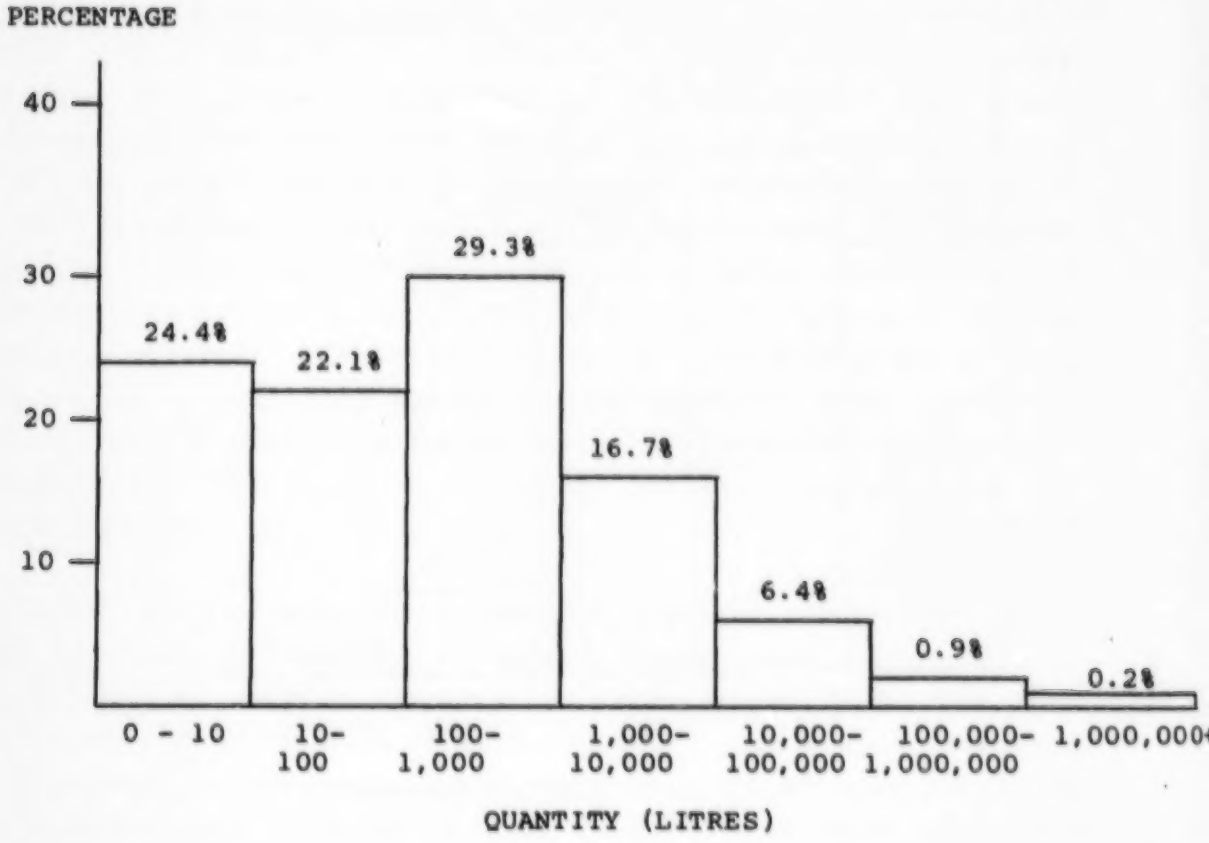
Combining the results of all these liquid spill categories shows that in 1989, 25.0% of all liquid spills with known quantities were less than 10 litres. By comparison in 1988, only 16.4% were less than 10 litres. Once again this substantiates the observation of increased reporting of smaller spills.

FIGURE 9
OIL SPILL QUANTITIES



Total number of oil spills: 2831
Spill quantities were known for 83% of these incidents.

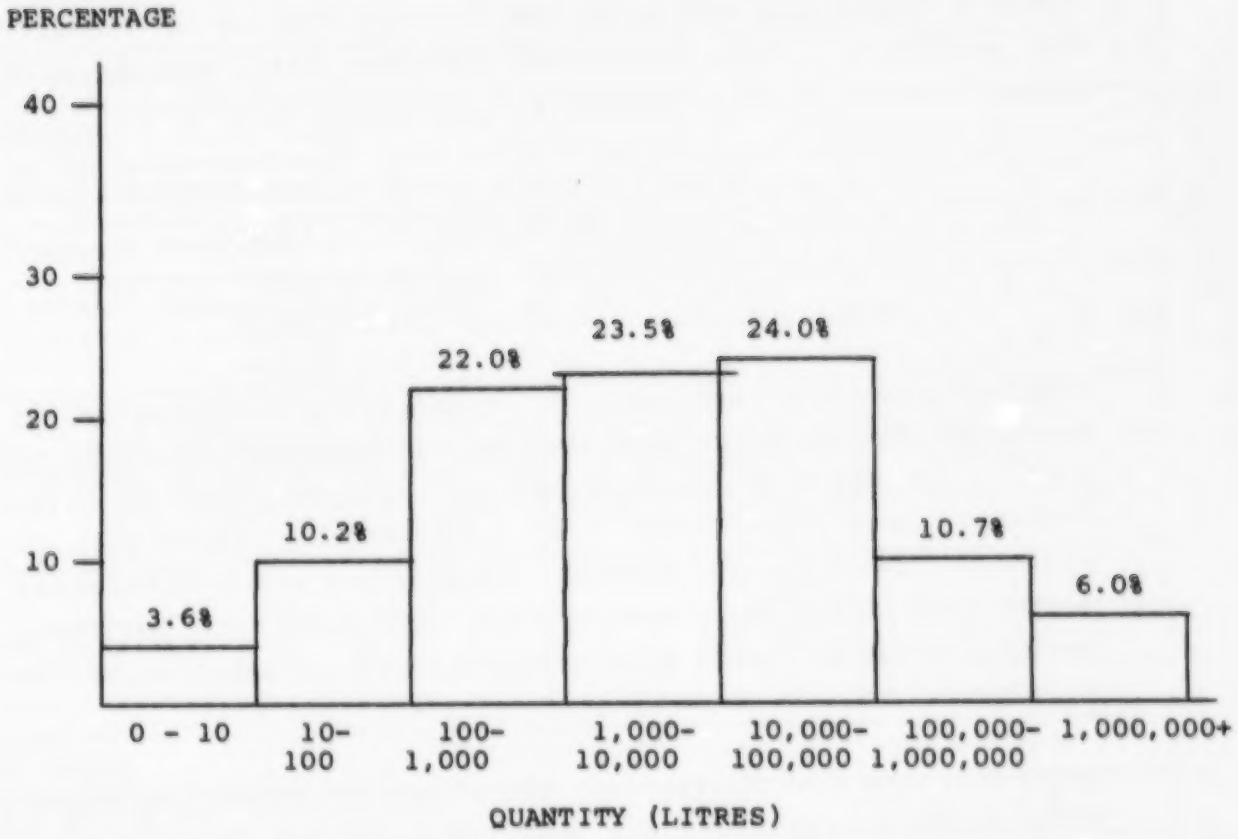
FIGURE 10
CHEMICAL SPILL QUANTITIES



Total number of chemical spills: 1118
Spill quantities were known for 70% of these incidents.

Note: Chemical spills include spills of chemical solutions. The volumes recorded are the volumes of the entire solutions not the volumes of the actual contaminants.

FIGURE 11
WASTE SPILL QUANTITIES



Total number of waste material spills: 763
Spill quantities were known for 56% of these incidents.

SECTOR AND SOURCE

Table 5 summarizes spills by the various sectors of industry and society. The industrial sectors with the largest proportions of reported spills are:

- Transportation - 13.4% (11.6% in 1988)
- Petroleum - 13.3% (13.4% in 1988)
- Chemical - 10.9% (10.2% in 1988)
- Metallurgical - 9.4% (10.4% in 1988)

Combined provincial and municipal hydroelectric related spills accounted for 10.6% of reported spills (compared to 12.5% in 1988). As was the case in 1988 the vast majority of these involved fluids discharged from transformers, capacitors or switches located throughout Ontario's vast electrical distribution network. Spills from provincial and municipal sewage treatment plants accounted for 4.7% of reported spills as compared to 4.9% in 1988.

Table 6 breaks down spills into the 21 source categories shown. These NATES source codes are unsuitable for the Ontario spill scenario if used independently, as evidenced by the fact that the general plant category, others and unknowns accounted for 55.5% of all reported spills in 1989.

This perceived shortcoming in the NATES system is substantially offset by the fact that the sector and source codes can be used concurrently to provide additional information. In fact, the NATES sector and source codes where intended to be used together. To demonstrate this, concurrent searches were performed on the largest categories in Tables 5 and 6 respectively.

TABLE 5
SPILLS BY SECTOR

SECTOR		NUMBER	PERCENTAGE
AGRICULTURAL		88	1.6
CHEMICAL		585	10.9
FOOD PROCESSING		81	1.5
FORESTRY		20	0.4
GENERAL MANUFACTURING		238	4.4
GOVERNMENT (FEDERAL)		16	0.3
GOVERNMENT (PROVINCIAL):	HYDRO	399	7.5
	STP	96	1.8
	OTHER	49	0.9
GOVERNMENT (MUNICIPAL):	HYDRO	167	3.1
	STP	154	2.9
	OTHER	110	2.1
METALLURGICAL		502	9.4
MINING		96	1.8
PETROLEUM		709	13.3
PULP AND PAPER		147	2.7
RECREATION		20	0.4
RESIDENTIAL		239	4.5
RETAIL		53	1.0
SERVICE INDUSTRY		230	4.3
TRANSPORTATION		715	13.4
OTHER		195	3.6
UNKNOWN		436	8.2
TOTAL		5345	100.0

STP = Sewage Treatment Plant or Water Pollution Control Plant

TABLE 6
SPILLS BY SOURCE

SOURCE	NUMBER	PERCENTAGE
AIRCRAFT	12	0.2
BULK (MARINE) CARRIER	7	0.1
MARINE TERMINAL	5	0.1
MARINE TANKER	16	0.3
WATERCRAFT (NOS)	23	0.4
PIPELINE	46	0.9
PRODUCTION FIELD	70	1.3
POWER OR HEATING PLANT	43	0.8
REFINERY	70	1.3
STORAGE DEPOT	155	2.9
STORAGE FACILITY (NOS)	217	4.1
PLANTS	1502	28.1
SERVICE STATION	263	4.9
SEWAGE TREATMENT PLANT	230	4.3
SEWER	44	0.8
TRANSPORT TRUCK	314	5.9
TANK TRUCK	351	6.6
MOTOR VEHICLE (NOS)	462	8.6
TRAIN	53	1.0
OTHER	1019	19.1
UNKNOWN	443	8.3
TOTAL	5345	100.0

NOS - Not Otherwise Specified

The largest category in Table 5 is the transportation sector. This sector can be broken down into the following sources:

TRANSPORTATION SECTOR BY SOURCE	NUMBER OF SPILLS	%
Transport Truck	228	31.9
Tanker Truck	199	27.8
Motor Vehicle (NOS)	148	20.7
Train	49	6.9
Watercraft (NOS)	17	2.4
Marine Tanker	13	1.8
Other Sources	61	8.5
	715	100.0

Similarly, the largest single category in the source summmary for 1989 is plants (see Table 6), which can also be broken down. By searching SAC's database for the plants source by sector for 1989, the following summary is obtained:

PLANTS BY SECTOR	NUMBER OF SPILLS	%
Metallurgical	482	32.1
Chemical	478	31.8
General Manufacturing	174	11.6
Pulp and Paper	128	8.5
Food Processing	60	4.0
Petroleum	17	1.1
Mining	13	0.9
Other Sectors	150	10.0
	1502	100.0

CAUSE AND REASON

Tables 7 and 8 summarize the various causes and reasons attributed to spills reported to SAC in 1989. Essentially, "cause" refers to how the spill occurred or to "what caused" it. "Reason" then attempts to amplify or clarify the cause category by explaining "why" the event occurred or the reason for the incident. It attempts to identify the primary contributing factor. For example, a spill may be caused by a transportation accident and the reason for the transportation accident may be equipment failure.

From Table 7 it can be seen that the five main causes for spills were:

- Container/fuel tank leak - 13.0% (11.5% in 1988)
- Pipe and hose leak - 11.1% (7.1% in 1988)
- Discharge/Bypass to watercourse - 10.2% (8.9% in 1988)
- Process upset (to air) - 9.7% (10.9% in 1988)
- Overflow (tanks, lagoons etc) - 9.2% (11.2% in 1988)

As was the case in 1988 the two most prevalent reasons for spills presented in Table 8 for 1989 are equipment failure - 19.2% (21.9% in 1988) and error - 14.2% (13.1% in 1988). The third most common reason in 1989 was material failure which accounted for 4.2% (3.4% in 1988).

TABLE 7
SPILLS BY CAUSE

CAUSE	NUMBER	PERCENTAGE
COLLISION (WATERCRAFT)	5	0.1
GROUNDING (WATERCRAFT)	0	0
SINKING (WATERCRAFT)	16	0.3
SHIP'S TANK/BILGE PUMPING	16	0.3
DERAILMENT	10	0.2
CRASH (AIRCRAFT)	4	0.1
OVERTURN (TRUCK/TRAILER)	123	2.3
OTHER TRANSPORTATION ACCIDENT	305	5.7
OVERFLOW (TANKS, LAGOONS)	492	9.2
PIPE AND HOSE LEAK	595	11.1
VALVE/FITTING LEAK OR FAILURE	407	7.6
BLADDER FAILURE	8	0.2
TANK LEAK (UNDERGROUND)	158	3.0
CONTAINER LEAK - FUEL TANKS	696	13.0
DISCHARGE/BYPASS TO WATERCOURSES	547	10.2
WELL BLOWOUT (OIL AND GAS)	1	0
PROCESS UPSET (TO AIR)	517	9.7
DYKE FAILURE (LAGOONS, PONDS)	12	0.2
COOLING SYSTEM LEAK (TRANSFORMERS)	387	7.2
TANK LEAK (SURFACE)	172	3.2
STARTUP/SHUTDOWNS/INTERRUPTIONS	87	1.6
OTHER DISCHARGES	360	6.7
UNKNOWN	427	8.0
TOTAL	5345	99.9

TABLE 8
SPILLS BY REASON

REASON	NUMBER	PERCENTAGE
INTENTIONAL/PLANNED	208	3.9
ERROR	760	14.2
VANDALISM	79	1.5
ICE, FROST DAMAGE	48	0.9
POWER INTERRUPTION	76	1.4
FIRE, EXPLOSION	133	2.5
STORM, FLOOD	84	1.6
COMBUSTION PROBLEMS	33	0.6
SUBSIDENCE	7	0.1
EQUIPMENT FAILURE	1,028	19.2
WELD/SEAM FAILURE	142	2.7
OVERSTRESS/OVERPRESSURE	191	3.6
CORROSION	116	2.2
MATERIAL FAILURE	222	4.2
DAMAGE BY MOVING EQUIPMENT	199	3.7
GASKET, JOINT	99	1.9
NEGLIGENCE (APPARENT)	113	2.1
ADVERSE ROAD CONDITION	70	1.3
CARELESS APPLICATION	1	0
UNKNOWN	1,445	27.0
OTHER	291	5.4
TOTALS	5,345	100.0

SPILLS TO THE GREAT LAKES

This section of the report provides some additional information on spills to the Great Lakes System. The importance of the Great Lakes cannot be overstated. They contain about 20% of all of the world's fresh water and serve an estimated 25 million people. While it is presumed that spills constitute a very small fraction of total pollution loadings to the Great Lakes, the immediate impact of some spills can be quite significant, especially near the source.

In 1989, 388 of the 5,345 spills reported to SAC (about 7.3%) were classified as spills to the Great Lakes System. This compares to 303 of 4,072 spills reported to SAC in 1988 (7.4%).

Table 9 provides a breakdown of 1989 Great Lake spills by water body and sector. It shows that about 44.6% (173) were spilled to Lake Ontario with the majority of these resulting from metallurgical sector operations. By comparison about 19.8% (77) of the Great Lake System spills were to the St. Clair River (35 from chemical sector operations, 18 from the petroleum sector and 12 were from the transportation sector which includes marine carriers and tankers).

The 388 Great Lakes spills reported in 1989 involved some 420 materials. Once again the number of materials spilled exceeds the number of spills because some incidents involved more than one spilled material. Table 10 summarizes these materials into the various oil, chemical and waste categories as well as unknown and others. About 38% were classified as oils, 30% as chemicals or chemical solutions and 27% as wastes or waste streams. These values change considerably when individual water bodies are considered. For example, chemical spills to

Lake Ontario only accounted for about 18% of all spills to the Lake in 1989, while in the St. Clair River almost half of the spills were classified as chemicals or chemical solutions.

Figures 12, 13 and 14 break down the oil, chemical and waste spills for the Great Lakes into the seven quantity groupings identified on page 23 of this report. From figure 12 it can be seen that 24.2% of known quantity oil spills to the Great Lakes system were less than 10 litres, 52.8% were less than 100 litres and 87.9% were less than 1,000 litres.

Figure 13 shows that chemical or chemical solution spills were generally larger than the oil spill quantities shown in figure 12. Only 10.1% of chemical spills were less than 10 litres, 34.2% less than 100 litres and 57.0% less than 1,000 litres. Larger quantity spills were evident for waste or wastewater discharges. Figure 14 shows that 58.7% of waste or wastewater spills to the Great Lakes were greater than 10,000 litres.

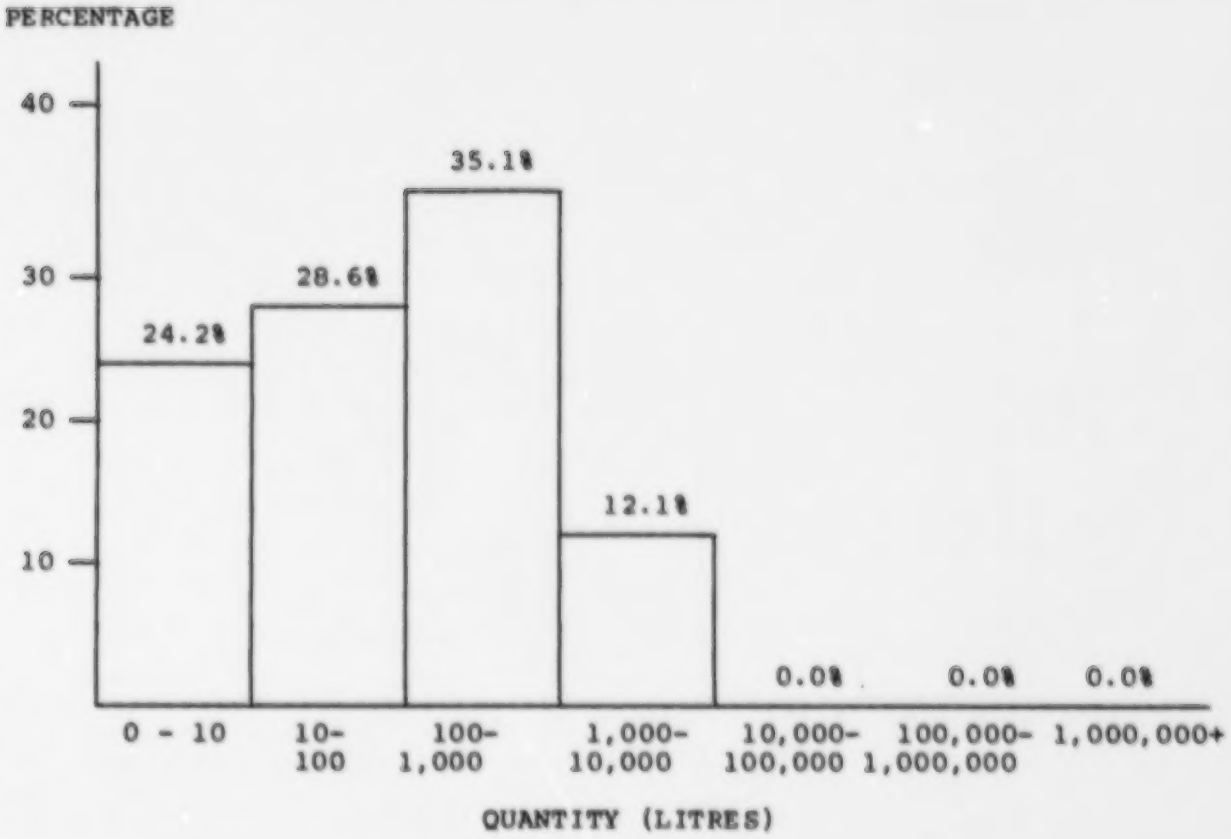
TABLE 9
SPILLS TO THE GREAT LAKES SYSTEM BY SECTOR

SECTOR	WATER BODY										
	L. SUPERIOR	ST. MARY'S R.	GEORGIAN BAY	L. HURON	ST. CLAIR R.	DETROIT R.	L. ERIE	NIAGARA R.	L. ONTARIO	ST. LAWRENCE R.	TOTAL
CHEMICAL					35	5		1	7	14	62
FOOD PROCESSING									1		1
GENERAL MANUFACTURING	2				3	4			4	2	15
GOVT. (FED)	1	1									2
GOVT. (PROV.)	1	2	2	7	1	1	3		4	4	25
GOVT. (MUN.)				1			1		12	1	15
METALLURGICAL		8				2	4		90		104
PETROLEUM	1				18	1	5		7		32
PULP & PAPER	7	1							2	4	14
RESIDENTIAL			1	1		1			5		8
RETAIL			1						1		2
SERVICE INDUSTRIES			1		1				3		5
TRANSPORTATION	2	2	4	2	12		1		14	3	40
OTHER			2	2			1		4	5	14
UNKNOWN	3	3	2	1	7	10	2	1	19	1	49
TOTAL	17	17	13	14	77	24	17	2	173	34	388

TABLE 10
SPILLS TO THE GREAT LAKES BY MATERIAL

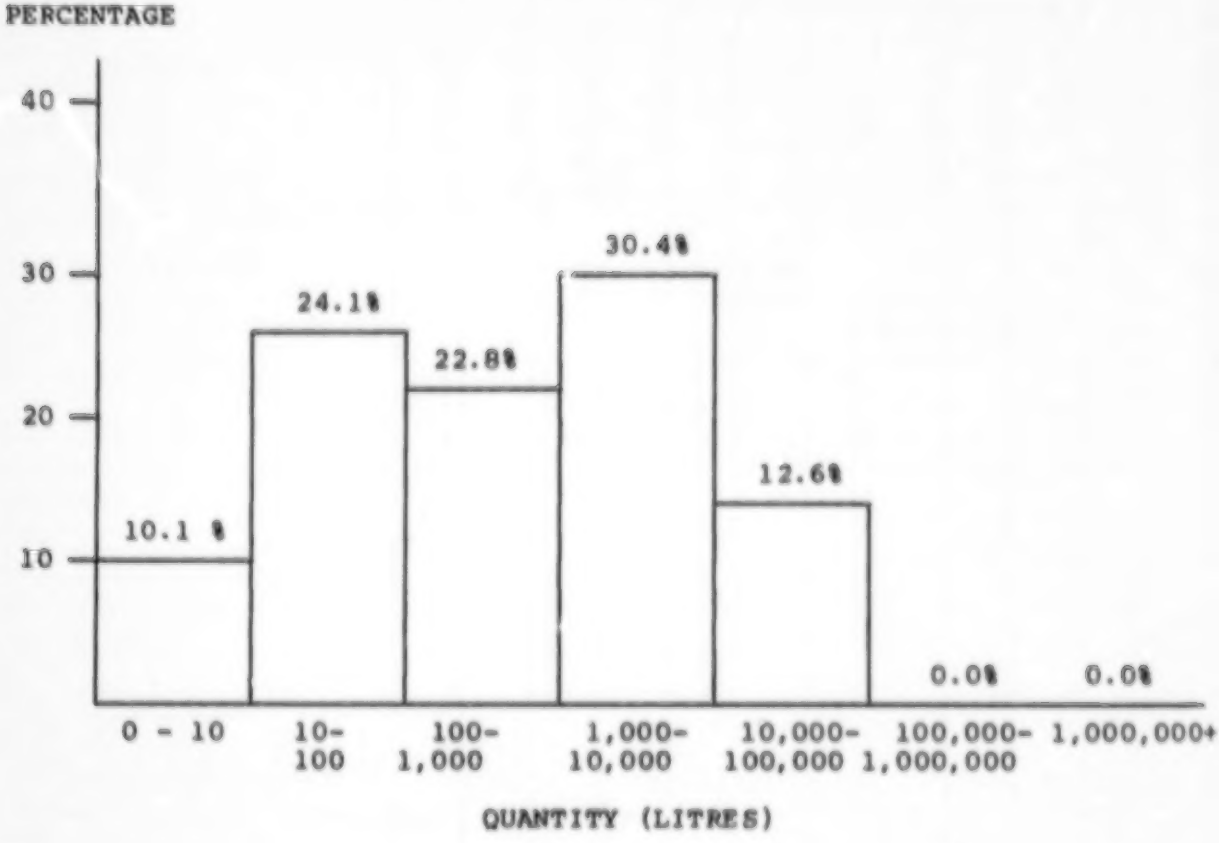
MATERIAL	WATER BODY										
	L. SUPERIOR	ST. MARY'S R.	GEORGIAN BAY	L. HURON	ST. CLAIR R.	DETROIT R.	L. ERIE	NIAGARA R.	L. ONTARIO	ST. LAWRENCE R.	TOTAL
OILS:											
GASOLINE/JET FUEL			1		1	2	1		7		12
LIGHT PETROLEUM OILS	2	2	6	1	11	5	2		21	3	53
HEAVY PETROLEUM OILS	1	3	2	4	9		3		9	3	34
OTHER PETROLEUM OILS	2	7	1	4	13	7	2		21	1	58
NON-PETROLEUM OILS	1				1				1		3
TOTAL OILS	6	12	10	9	35	14	8		59	7	160
CHEMICALS:											
ACIDS	1				2		1		3	9	16
BASES	2				2				2	2	8
HALOGENATED SOLVENTS									1		1
NON-HALOGENATED SOLVENTS	1				23				1	1	26
PESTICIDES		1									1
PCB'S									1		1
OTHER ORGANIC	3	1			12	1			13	4	34
OTHER INORGANIC				4	6	2	4		12	10	38
TOTAL CHEMICALS	7	2		4	45	3	5		33	26	125
WASTES:											
LIQUID INDUSTRIAL	2	3	1		4	4	3		34		51
HAZARDOUS		1			1				1	1	4
NON-HAZARDOUS SOLID			1		1				1		3
SEWAGE	1		1	1		1	1		15		20
AGRICULTURAL											
OTHER WASTES	1	1	1		3	4	1		24		35
TOTAL WASTES	4	5	4	1	9	9	5		75	1	113
UNKNOWN		1						2	10		13
OTHER		1			2				6		9
TOTALS	17	21	14	14	91	26	18	2	183	34	420

FIGURE 12
GREAT LAKES OIL SPILL QUANTITIES



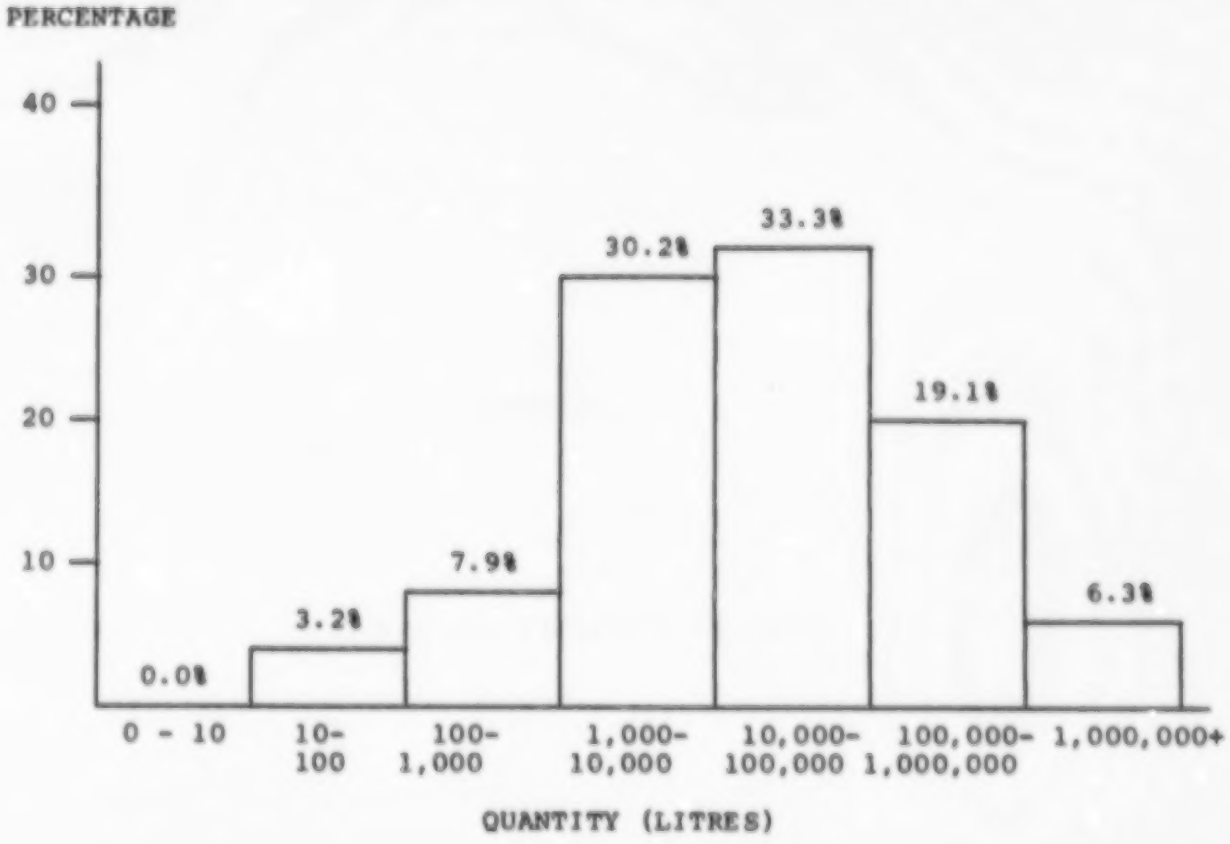
Total number of oil spills to Great Lakes: 160
Spill quantities were known for 57% of these incidents.

FIGURE 13
GREAT LAKES CHEMICAL SPILL QUANTITIES



Total number of chemical spills to Great Lakes 125
Spill quantities were known for 63% of these incidents.

FIGURE 14
GREAT LAKES WASTE SPILL QUANTITIES



Total number of waste spills to Great Lakes 113
Spill quantities were known for 56% of these incidents.

APPENDIX I

SAMPLE OCCURRENCE REPORT

MINISTRY OF THE ENVIRONMENT
OCCURRENCE REPORT INFORMATION SYSTEM

Jan. 10,1991
PAGE: 1

OCCURRENCE REPORT

Received By	Region No.	S.A.C. No.	I.E.B. No.
LEO TASCA	894020565-	8914458-	

Occurrence Type: SPILL
Subtype: LAND
Action Class: 1:[16] 2:[ ] 3:[ ]

	Date	Time (24 hr)
Occurrence:	89/11/17	11:00
Report to SAC:	89/11/17	11:53
Report to MOE:	89/11/17	11:53
MOE at Scene:		:

Reported by (Name/Organization)
STEPHEN MATHESON
PETRO-CANADA BULK TERMINAL
Tel. No.: 613-225-9200 EXT.:
Alt. No.: - - EXT.:
Address:
1985 MERIVALE RD.
NEPEAN
Postal Code:

Environmental Officer Assigned:
DAN HARRISON

Location of Occurrence:
Region..: 4 SOUTHEAST
District: OT OTTAWA
Municipality: 20104
NEPEAN CITY
1985 MERIVALE RD.

Source:
PETRO CANADA
BULK PLANT/TERMINAL

Source: [SD] Sector: [PE] SIC: [3610]
UTM:
N: [ ] E: [ ] Zone: [ ]

Brief Summary:
AIR ELIMINATOR ON LOADING RACK MAY HAVE BEEN FROZEN IN THE OPEN POSITION DUE TO COLD WEATHER. THIS RESULTED IN A 200 L OVERFLOW OF A GAS/DIESEL MIXTURE TO GROUND FROM THE SLOP TANK. SPILL CONTAINED. FRANCIS FUELS HAS BEEN CALLED IN TO VACUUM MATERIAL. SOME CONTAMINATED GRAVEL REMAINS.
1333: FROM TOM LAWSON: NOW EST. 800 L SPILLED. NO OFF-SITE IMPACT. SPILL WAS CONTAINED, TRENCHED AND VACUUMED.
1400: THIS REPORT FAXED TO MCCR FUEL SAFETY HEADQUARTERS.

If there are related reports, list them in the summary preceeded by 'RELATED'.

Follow-up Action: [Y] Abatement [N] IEB
FIELD REPORT RECEIVED BY SAC ON 89/11/23.

Suspected Violation Code: [ ]
No Further Action By: [Y] Abatement [Y] File Closed [Y] IEB

IEB Investigator Assigned

Report Prepared by:	Date	BF Date	Person-Days	MBR	Function
DAN HARRISON	89/11/20				

District Officer	Date	Reviewing Officer	Date
G.R. CLARKE	89/11/20		

List numbers showing: A - routing of the original, B - distribution of copies.

A: [ ][ ][ ][ ][ ]
B: [ ][ ][ ][ ][ ][ ]

1. Investigator/ERP
2. Distr.officer/file
3. SAC
4. Reg.Dir or Mgr
5. IEB Reg. Super.
6. IEB H.O./file

OCCURRENCE REPORT CONT'D

Region No.: 894020565- S.A.C. No.: 8914458- IEB No.:

Material 1: GASOLINE/DIESEL MIXTURE — Code..: 41
Amount: 800 L — UN No.:
Material 2: — Code..:
Amount: — UN No.:
Material 3: — Code..:
Amount: — UN No.:

Cause.....: OVERFLOW (TANKS, LAGOONS) — Code..: 09
Reason.....: ICE/FROST DAMAGE — Code..: 04

Contact: [N] ERP Name: Date:
Callout: [ ] SAC Operator: Time: :

Controller of Material: PETRO-CANADA — Code..:
Owner of Material.....: PETRO-CANADA — Code..:
Agencies Involved.....: MCCR

Clean up and Restoration Carried out by:
[Y] Controller [Y] Owner [Y] Other: FRANCIS FUELS

% Cleaned up: 99.00 Estimated Cost: $
Were Directions or Approval Given Under EPA Part IX [N] Regulation 11/82 [N] | Emergency Generator No.

Waste Class: LIGHT FUELS — Code..: 221
Hauler: — Code..:
Disposal Site: — Code..:

Environmental Impact: NOT ANTICIPATED | Nature of Impact: — Code..:

People/Business Damaged
(Other than to Owner/Controller)

Nature of Damage: — Code..:

APPENDIX II

MINISTRY OF THE ENVIRONMENT
OCCURRENCE REPORTING INFORMATION SYSTEM
CODING CATEGORIES

MINISTRY OF THE ENVIRONMENT
OCCURRENCE REPORT INFORMATION SYSTEM

Code Summary

TYPE OF OCCURRENCE

S SPILL

L Land W Water A Air

N NOTIFICATION

01 Condition of Operation
02 C of A Non-Compliance
03 Order Non-Compliance

C COMPLAINT

01 Odour	05 Litter/Waste	09 Pesticides
02 Noise	06 Water Pollution	99 Other
03 Dust/Particulate	07 Drinking Water	
04 Smoke	08 Vegetation Damage	

O OTHER

MATERIAL CODE

10 SERIES: OILS

11 Crude
12 Gasoline, Jet Fuel, Kerosene
13 Light Petroleum Oils: Motor, Diesel, Furnace, Mineral, etc.
14 Heavy Petroleum Oils: Bunker, Lubricating, Tar, Asphalt, etc
15 Other Petroleum Oils
16 Non-Petroleum Oils

20 SERIES: CHEMICALS

21 Acids
22 Bases
23 Halogenated Solvents
24 Non-Halogenated Solvents
25 Pesticides
26 PCB's
27 Other Organic
28 Other Inorganic

30 SERIES: GASES

31 Smoke
32 Dust/Particulate
33 NOx
34 SO2
35 Natural
36 Other Air Emission

40 SERIES: WASTES

41 Liquid Industrial
42 Hazardous
43 Non-Hazardous Solid
44 Sewage
45 Agriculture
46 Other Wastes

90 SERIES: MISCELLANEOUS

96 Feed & Foodstuff
97 Not Applicable
98 Unknown
99 Other

SOURCE CODE DESCRIPTION

AC AIRCRAFT - all vehicles that fly (except hovercraft)

BC BULK MARINE CARRIER - carriers of solid bulk cargo

MT MARINE TANKER - carriers of liquid/gaseous bulk cargo

PC PLEASURE CRAFT - privately owned recreational watercraft

OW OTHER WATERCRAFT - other commercial or gov't watercraft

MR MARINE TERMINAL - commercial waterfront facility

TP TRANSPORT TRUCK - general cargo transport road vehicle

TT TANKER TRUCK - vehicles carrying bulk cargo in liquid/gaseous/ powdered or other pumpable form

MV MOTOR VEHICLE - road vehicles not otherwise defined

TR TRAIN/RAILROAD - all vehicles that run exclusively on rails

PF PRODUCTION FIELD - spills of raw materials at point of extraction

PL PIPELINE - bulk transportation lines (excluding "in-plant" piping

RF PETROLEUM REFINERY - petroleum refining facilities

SS SERVICE STATION - incl. airports, marinas and motor vehicle facilities

SD STORAGE DEPOT - bulk storage facilities from which materials are distributed for sale

OS OTHER STORAGE FACILITY - storage for on-site/private use (industrial plants, farms, residences)

HP HEATING/POWER PLANT - includes electric generating stations

OP OTHER PLANT - manufacturing/processing facilities (except refineries)

ST SEWAGE TREATMENT - includes WPCP's and lagoons

SW SEWER SYSTEM - municipal/industrial wastewater collection systems

WD WASTE DISPOSAL - landfill sites, industrial waste treatment plant

WS WATER SUPPLY - water treatment/distribution systems

OT OTHER - source not otherwise defined

UK UNKNOWN - source not determined

SECTOR CODE DESCRIPTION

AG AGRICULTURAL - includes co-ops, farms, ranches

CH CHEMICAL - chemical processing facilities that produce basic chemicals or feed stocks (incl. derivative products) and associated bulk transport vehicles

FD FOOD PROCESS - canners, meat/fish packers (NOT distribution/retail)

FO FORESTRY - forestry activities, operations vehicles

GOVERNMENT - GM(municipal, GP(provincial), GF(federal) - governmental and quasi-governmental bodies/organizations

GN GENERAL MANUFACTURING - light manufacturing: (metal plating/fabricating, textiles etc.)

ME METALLURGICAL - steel (and other metal) manufacturing

MN MINING - mining operations and associated equipment/vehicles

PE PETROLEUM - includes bulk transport vehicles and service stations

PP PULP AND PAPER - processing facilites of pulp and paper industry

RE RECREATION - facilities which provide relaxation/enjoyment

RS RESIDENTIAL/PRIVATE - houses, cottages, vehicles, boats, aircraft etc.

RT RETAIL - diversified retail establishments (not otherwise covered)

SI SERVICE INDUSTRY - establishments offering services (e.g. dry cleaners, waste disposal, contractors, hotels, etc. and includes libraries and educational institutions.

TA TRANSPORTATION - carriers whose only business is providing transportation services

OT OTHER - sector not otherwise defined

UK UNKNOWN - sector not determined

CAUSE CODE DESCRIPTION

01 COLLISION (WATERCRAFT) - accidents involving watercraft only

02 GROUNDING (WATERCRAFT) - watercraft running aground

03 SINKING (WATERCRAFT) - other than from collision or grounding

04 SHIP'S TANK/ BILGE PUMPING - wastewater discharges from watercraft

05 DERAILMENT - accidents where railcars or engines leave the rails

06 CRASH (AIRCRAFT) - applies only to aircraft accidents

07 OVERTURN (TRUCK/TRAILER) - trucks and tractor-trailers only

08 OTHER TRANSPORT ACCIDENT - road vehicle accidents other than above

09 OVERFLOW (TANKS, LAGOONS) - overfilling tanks, containers & dikes.

10 PIPE AND HOSE LEAK - from piping systems but not cooling systems

11 VALVE/FITTING LEAK OR FAILURE - leaks from specific parts of equipment containers or pipelines

12 BLADDER FAILURE - leaks from flexible storage containers

13 TANK LEAK (UNDERGROUND)- buried storage tanks and associated piping

14 CONTAINER LEAK, FUEL TANKS, BARRELS - includes bottles, boxes, vats & vehicle fuel/cargo tanks (other than cause 13 or 20)

15 DISCHARGE/BYPASS TO WATERCOURSES - accidental or unusual variation of wastewater discharges to watercourses

16 WELL BLOWOUT (OIL AND GAS) - applies to oil or gas wells

17 PROCESS UPSET - an unusual variation in the regular discharge of a contaminant to air due to a fluctuation in the process

18 DYKE FAILURE (LAGOONS, PONDS) - storage pond/lagoon wall failure

19 COOLING SYSTEM LEAK - applies to transformers, capacitors, vehicle radiators, nuclear reactors or other power plants

20 TANK LEAK (SURFACE) - storage tanks (fixed), tank-farm, heating systems (incl. delivery to disconnected filler-pipes)

21 START-UPS/ SHUTDOWNS/ INTERRUPTIONS - operating condition change

98 UNKNOWN - cause of release not determined

99 OTHER DISCHARGES - to air/land/water, not otherwise defined

REASON CODE DESCRIPTION

01 INTENTIONAL/PLANNED - intentional or planned releases

02 ERROR - releases due to mistakes

03 VANDALISM - illegal/deliberate releases (incl. sabotage)

04 ICE/FROST DAMAGE - releases resulting from freezing, frost heave, the weight of snow/ice, or falling ice

05 POWER INTERRUPTION - releases resulting from a loss of power supply

06 FIRE/EXPLOSION - releases resulting from fires/explosions (NOT releases that CAUSE a fire or explosion)

07 STORM/FLOOD - releases resulting from storm/flood/lightning (incl. compulsory wastewater bypasses due to high flows)

08 EARTHQUAKE/SLIDE - releases resulting from natural earth movements

09 SUBSIDENCE - releases through settling of distributed soils

10 EQUIPMENT FAILURE - malfunctioning system components (eg. brakes, valves)

11 WELD/SEAM FAILURE - releases from point where material is joined to form the wall of a pipe/tank or other vessel

12 OVERSTRESS/OVERPRESSURE - any form of overloading wherein the design strength of the container was exceeded

13 CORROSION - includes all forms of corrosion (internal/external)

14 MATERIAL FAILURE - poor design or substandard materials

15 DAMAGE BY MOVING EQUIPMENT - containers damaged by vehicles, etc.

16 GASKET/JOINT - any point of connection (except reason 11)

17 NEGLIGENCE (APPARENT) - releases due to lack of diligence

18 ADVERSE ROAD CONDITION - road faults, ice/snow, material on road

19 COMBUSTION PROBLEMS - stack emissions due to poor burning conditions

97 CARELESS APPLICATION - misuse of pesticides, fertilizers, sludge, etc.

98 UNKNOWN - primary reason for release not determined

99 OTHER - primary reason for release not otherwise defined